

ranges of water temperature; the average depth at which the observations were made; and the mean temperature of the air:

Temperature of water for December, 1886.

Station.	Temperature at bottom.		Range.	Average depth, feet and tenths.	Mean temperature of the air at station.
	Max.	Min.			
Alpena, Michigan a.....	30.7	28.6	2.1	10.4	19.9
Augusta, Georgia.....	49.6	37.2	12.4	8.0	42.6
Baltimore, Maryland.....	44.5	34.1	10.4	11.9	31.3
Block Island, Rhode Island.....	48.5	35.2	13.3	8.3	34.0
Boston, Massachusetts.....	34.0	32.2	1.8	13.8	23.6
Buffalo, New York.....	49.7	46.2	3.5	15.4	47.5
Canby Fort, Washington Territory.....	62.1	49.6	12.5	7.7	54.4
Cedar Keys, Florida.....	55.0	48.0	7.0	36.5	48.4
Charleston, South Carolina.....	49.5	29.7	19.8	3.1	36.4
Chincoteague, Virginia.....	33.2	32.0	1.2	7.9	25.0
Chicago, Illinois.....	36.0	32.0	4.0	13.4	25.3
Cleveland, Ohio.....	35.6	34.1	1.5	10.6	8.9
Detroit, Michigan d.....	64.2	53.6	10.6	13.8	56.2
Duluth, Minnesota e.....	32.9	32.0	0.9	17.6	22.5
Escondido, Texas.....	59.0	51.6	7.4	18.0	52.8
Galveston, Texas.....	76.5	65.0	11.5	18.4	67.5
Grand Haven, Michigan f.....	36.6	32.8	3.8	9.3	22.6
Jacksonville, Florida.....	56.9	44.7	12.2	14.7	45.2
Key West, Florida.....	35.2	31.4	3.8	11.7	15.6
Mackinaw City, Michigan g.....	56.9	44.7	12.2	14.7	45.2
Macon, Fort, North Carolina.....	47.0	37.5	9.5	11.4	29.9
Marquette, Michigan h.....	45.3	34.8	10.5	14.9	30.8
Mobile, Alabama.....	46.3	29.8	16.5	16.3	37.7
New London, Connecticut.....	67.1	50.9	16.2	16.9	51.3
New York City.....	42.9	30.0	12.9	17.4	23.1
Norfolk, Virginia.....	47.9	44.2	3.7	52.6	45.5
Pensacola, Florida.....	52.6	51.7	0.9	37.5	53.1
Portland, Maine.....	53.8	42.5	11.2	10.3	48.5
Portland, Oregon.....					
Sandusky, Ohio d.....					
San Francisco, California.....					
Savannah, Georgia.....					
Toledo, Ohio d.....					

- a Frozen from 2d to 6th and from 16th to 31st.
- b Frozen, 5th to 10th and from the 17th to 31st.
- c Frozen 5th, 6th, 7th, and from 27th to 31st.
- d Frozen throughout the month.
- e Frozen from 5th to 31st.
- f Frozen from 27th to 31st.
- g Frozen 2d, 3d, 4th, and from the 15th to 31st.
- h Frozen from 18th to 24th and from 26th to 31st.

PRECIPITATION.

[Expressed in inches and hundredths.]

The distribution of rainfall over the United States and Canada for December, 1886, as determined from the reports of about five hundred and eighty stations, is exhibited on chart iii.

The precipitation of December, 1886, is nearly normal in all parts of the country, except in the Gulf and south Atlantic states and along the Pacific coast. In the Gulf and south Atlantic states the precipitation of the month is largely below the normal; within these districts three stations only, Charlotte, New River, and Wilmington, North Carolina, show an excess of precipitation; at all other stations the monthly precipitation ranges from one-half to one-seventh of the normal. The average precipitation for December, 1886, at Signal Service stations in the east Gulf states is only one-half the normal, and in the west Gulf states the average is less than one-third of the normal. Along the coast of Washington Territory and Oregon very large departures in excess of the normal occur, and in California large deficiencies. The rainfall of the western part of Washington Territory and Oregon deserves special mention, several stations reporting over fifteen inches; at Neah Bay, Washington Territory, 30.70 inches of rain fell, and at Tatoosh Island, Washington Territory, 25.84, which is 14.82 in excess of the normal.

The following are some of the most marked departures from the normal precipitation at Signal Service stations:

Above normal.		Below normal.	
	Inches.		Inches.
Tatoosh Island, Washington Ter.....	14.82	Shreveport, Louisiana.....	4.81
Olympia, Washington Territory.....	4.19	Little Rock, Arkansas.....	4.08
Portland, Oregon.....	3.37	Vicksburg, Mississippi.....	3.91
Eastport, Maine.....	2.51	Los Angeles, California.....	3.41
Block Island, Rhode Island.....	2.08	Palestine, Texas.....	3.10
Coeur d'Alene, Idaho.....	1.94	San Francisco, California.....	2.86

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows, for certain stations, as reported by voluntary observers, the average precipitation for the month of December for a series of years, the precipitation for December, 1886, and the departures from the average:

Station.	County.	Average precipitation for Dec.	Number of years.	Precipitation for Dec., 1886.	Departure.
		Inches.		Inches.	Inches.
Lead Hill.....	Arkansas.	4.78	5	1.51	- 3.27
Full Brook.....	California.	2.42	10	0.30	- 2.12
Sacramento.....	Sacramento.....	4.60	21	2.13	- 2.47
Canton *.....	Connecticut.	3.63	25	2.71	- 0.92
Hartford *.....	Hartford.....	3.65	15	4.64	+ 0.99
Middletown *.....	Middlesex.....	3.74	28	5.72	+ 1.98
Wallington *.....	New Haven.....	4.18	28	6.77	+ 2.59
Anna.....	Illinois.	3.25	11	3.25	0.00
Mattoon.....	Colo.	3.21	6	1.88	- 1.33
Peoria.....	Peoria.....	2.41	30	0.89	- 1.52
Riley.....	McHenry.....	2.00	26	1.13	- 0.87
Sycamore.....	De Kalb.....	2.75	6	1.45	- 1.30
Lafayette.....	Indiana.	3.02	7	1.96	- 1.06
Logansport.....	Tippecanoe.....	2.52	32	0.85	- 1.67
Vevay.....	Switzerland.....	4.12	21	2.89	- 1.23
Monticello.....	Iowa.	2.40	33	0.84	- 1.56
Independence.....	Kansas.	2.39	14	0.65	- 1.74
Lawrence.....	Montgomery.....	1.63	19	0.83	- 0.80
Wallington.....	Douglas.....	0.98	8	0.08	- 0.90
Yates Centre.....	Sumner.....	1.45	7	0.49	- 0.96
Grand Coteau.....	Woodson.....	6.76	3	3.26	- 3.50
Gardiner *.....	Louisiana.	3.70	48	4.68	+ 0.98
Orono *.....	Maine.	3.98	18	6.38	+ 2.40
Fallston.....	Maryland.	3.52	16	4.22	+ 0.70
Cambridge *.....	Massachusetts.	3.71	46	5.04	+ 1.23
Chestnut Hill *.....	Middlesex.....	3.35	11	5.82	+ 2.47
Framingham *.....	Middlesex.....	3.47	12	5.17	+ 1.70
Lake Cochituate *.....	Middlesex.....	3.51	35	5.67	+ 2.16
Lowell *.....	Middlesex.....	3.25	62	4.94	+ 1.69
Lynn *.....	Essex.....	2.76	12	5.75	+ 2.99
Mystic Lake *.....	Middlesex.....	3.01	11	4.68	+ 1.67
New Bedford *.....	Bristol.....	4.12	74	6.78	+ 2.66
Somerset.....	Bristol.....	3.24	16	5.54	+ 2.30
Springfield *.....	Hampden.....	3.51	39	3.76	- 0.25
Waltham *.....	Middlesex.....	2.95	61	6.25	+ 3.30
Williamstown *.....	Berkshire.....	2.63	18	4.04	+ 1.41
Carson City.....	Nevada.	2.00	8	0.72	- 1.28
Saint John *.....	New Brunswick.	4.67	26	6.81	+ 2.14
Concord *.....	New Hampshire.	2.87	30	3.30	+ 0.43
Hanover *.....	Grafton.....	2.08	21	1.99	- 0.09
South Orange.....	Essex.....	3.75	17	3.55	- 0.20
Factoryville.....	Tioga.....	1.41	5	0.77	- 0.64
Palermo.....	Oswego.....	3.97	33	2.97	- 1.00
Waukegan.....	Fulton.....	2.32	14	3.07	+ 0.75
Dyberry.....	Wayne.....	2.54	18	2.32	- 0.22
Stateburg.....	Sumter.....	3.41	6	2.56	- 0.85
New Ulm.....	Austin.....	4.59	14	0.97	- 3.62
Lunenburg *.....	Essex.....	2.94	38	3.40	+ 0.46
Newport *.....	Orleans.....	2.93	12	2.81	- 0.12
Stratford.....	Orange.....	3.20	12	2.70	- 0.50
Bird's Nest.....	Northampton.....	3.70	18	5.25	+ 1.55
Dale Enterprise.....	Rockingham.....	3.17	6	4.15	+ 0.98
Variety Mills.....	Nelson.....	3.77	8	3.06	- 0.71
Wythville.....	Wythe.....	2.94	22	3.35	+ 0.41
Helvetia.....	West Virginia.	4.51	10	4.57	+ 0.06

* From the "Bulletin of the New England Meteorological Society."

The following notes on the precipitation of December and the year 1886 are given by voluntary observers:

Illinois.—Riley, McHenry county: during the past twenty-six years the December precipitation was the greatest in 1863, total for month, 4.16; it was least in 1874, total, 0.48; during 1886 rain fell on eighty-one days, snow on forty-three days; total precipitation of the year, 31.24, which is 2.94 below the average of the past twenty-five years; in that time the largest annual precipitation occurred in 1881, total, 47.22; the least in 1874, total, 24.86.

Sandwich, DeKalb county: the precipitation of 1886, 27.41, is 13.20 below the average of the past thirty-five years; the precipitation of 1868, 1877, and 1878 is less than that of 1886, the fall for those years being respectively 28.75, 28.50, and 21.01.

Indiana.—Logansport, Cass county: since 1854 the greatest December precipitation, 5.99, fell in 1881; the least, 0.85, in 1886.

Iowa.—Monticello, Jones county: the precipitation of the year, 29.40, is 7.60 below the average of the past thirty-three years; in that time the largest December precipitation, 6.99, fell in 1856; the least, 0.65, in 1867.

Kansas.—Lawrence, Douglass county: the precipitation of the year, 24.25, is 11.02 below the average of the past nineteen years, it is also the smallest annual precipitation in that time.

Massachusetts.—Somerset, Bristol county: the precipitation of the year, 46.86, is 1.50 above the average of the past sixteen years.

New York.—Palermo, Oswego county: the precipitation of 1886, 31.10, is 5.80 below the average of the past thirty-three years; the total depth of snowfall, 75.75, is 20.00 below the average of the same time.

Ohio.—Wauseon, Fulton county: the total precipitation of the year, 30.88, is 8.33 less than the average of the past fourteen years, it is also the smallest in that time; the snowfall of the month, 19.90, is nearly double the average for December.

Virginia.—Dale Enterprise, Rockingham county: during the past six years the heaviest December precipitation, 5.04, fell in 1884; the least, 0.13, in 1882. The following table gives the total precipitation and depth of unmelted snow for each year from 1880 to 1886, inclusive:

Year.	Precipitation.	
	Rainfall and melted snow.	Snows, aggregate depth.
	Inches.	Inches.
1880.....	37.13	52
1881.....	38.61	20
1882.....	56.01	45
1883.....	37.42	35
1884.....	51.00	29
1885.....	47.37	22
1886.....	78.41	58
Mean.....	49.57	37

Wytheville, Wythe county: the total precipitation of the year, 46.44, is 4.65 above the average of the past twenty-two years.

Variety Mills, Nelson county: during the past eight years the greatest December precipitation, 6.29, fell in 1881; the least, 1.80, in 1880; the precipitation of the year, 48.73, is 9.43 above the average for seven years, it is also the greatest in that time; the least, 31.69, fell in 1879.

In the following table are shown, for the several geographical districts, the normal precipitation for December; the average for December, 1886, and the excess or deficiency as compared with the normal:

Average precipitation for December.

Districts.	Average for Dec., Signal-Service observations.		Comparison of Dec., 1886, with the average for several years.
	For several years.	For 1886.	
	Inches.	Inches.	Inches.
New England.....	4.41	5.31	+ 0.90
Middle Atlantic States.....	3.50	3.77	+ 0.27
South Atlantic States.....	4.25	3.90	- 0.35
Florida Peninsula.....	2.48	2.29	- 0.19
Eastern Gulf States.....	5.31	2.80	- 2.51
Western Gulf States.....	4.30	1.30	- 3.00
Rio Grande Valley.....	1.69	0.38	- 1.31
Tennessee.....	4.47	3.23	- 1.24
Ohio Valley.....	3.64	2.25	- 1.39
Lower lake region.....	3.04	2.88	- 0.16
Upper lake region.....	2.32	1.62	- 0.70
Extreme northwest.....	0.60	0.54	- 0.06
Upper Mississippi Valley.....	2.16	1.17	- 0.99
Missouri Valley.....	0.90	0.76	- 0.14
Northern slope.....	0.92	0.84	- 0.08
Middle slope.....	1.16	0.27	- 0.89
Southern slope.....	1.26	0.01	- 1.25
Southern plateau.....	1.36	0.16	- 1.20
Middle plateau.....	1.33	1.05	- 0.28
Northern plateau.....	2.27	3.59	+ 1.32
North Pacific coast region.....	8.22	10.73	+ 2.51
Middle Pacific coast region.....	3.98	2.59	- 1.39
South Pacific coast region.....	2.11	0.12	- 1.99

SNOW.

Montgomery, Alabama: on the 5th light snow began at 11.25 a. m.; at 1.30 p. m. it began falling heavily and continued until 5 a. m. of the 6th. This snow storm was heavier than any other that has occurred in this city; the depth in the vicinity of the Signal Office was eleven inches; reports from places outside of the city show a depth of from fifteen to eighteen inches. Railroad travel was interrupted and street cars were

blockaded. The snow on the ground did not all disappear until the 11th.

Mobile, Alabama: light rain fell during the night of the 3d-4th and at intervals throughout the 5th. About noon the temperature began falling rapidly, the thermometer indicating 39° at 3 p. m. High northerly winds prevailed during the night of the 4-5th. Light snow began falling at 5.20 a. m. of the 5th and continued at intervals throughout the day; total snowfall one-half an inch; the storm was accompanied by high northwesterly wind and low temperature.

Livingston, Sumter county, Alabama: on the 4th and 5th snow fell to a depth of two inches and did not disappear until the afternoon of the 6th.

Pensacola, Florida: light rain fell during the afternoon of the 3d and until 5 a. m. of the 4th; shortly after midnight a heavy southeasterly wind set in, maximum velocity thirty-seven miles per hour. High wind and rain prevailed during the 5th, with low temperature and ice forming on calm water. Light snow fell from 4.25 to 8.20 p. m., average depth one and a half inches.

Forsyth, Monroe county, Georgia: on the 4th, 5th, and 6th, cold weather with sleet and snow prevailed; several years have passed since snow has fallen here so early in the season.

Charleston, South Carolina: the morning of the 6th opened with snow, which melted as it fell, and continued until 11 a. m. This is an unusual phenomenon for this region and was the first snow storm of any consequence that has occurred in Charleston for many years. The storm extended over the whole state; in some districts the snow did not melt but lay on the ground six or eight inches deep for several hours.

Columbia, South Carolina: during the 5th and 6th a very heavy sleet prevailed in this vicinity, and all objects were covered with ice from one to two inches in thickness. The city street railways were obliged to suspend travel on account of the ice. Reports from various parts of the surrounding country indicate that the storm was general, in some places heavy snow fell instead of sleet. It is stated that considerable apprehension was felt by farmers for the safety of their cattle, as in this state but few cattle are housed.

Asheville, Buncombe county, North Carolina: snow fell during the 5th and 6th to a depth of twenty-six inches. The weight of snow crushed the roof of the Asheville tobacco works, ruining a large stock of tobacco; the roofs of several other buildings were broken in by the snow.

Norfolk, Virginia: at 9.30 p. m. of the 6th light snow began falling, becoming heavy after midnight and continuing until 7.25 a. m. of the 7th. This was the heaviest snowfall that has occurred in this section of the country for several years and, being accompanied by high northerly winds, drifted to a considerable depth, causing a suspension of travel on the street-car lines.

Lynchburg, Virginia: snow began falling at 8.15 a. m. of the 4th and continued until the morning of the 5th, when it was accompanied by sleet and rain; during the night of the 5-6th heavy snow fell. The total depth of snowfall during this storm was thirteen inches. Trains on all roads passing through Lynchburg were delayed several hours. Reports show a very heavy snow in all parts of the state, especially in the mountainous portion. During this storm very low temperature prevailed, and the James River at this point was frozen from bank to bank and remained so until the 14th, when the ice broke up.

Wytheville, Wythe county, Virginia: snow began falling during the morning of the 4th and continued until the afternoon of the 6th; total depth sixteen inches. The roofs of several old buildings were crushed by the weight of snow. During the storm a number of sheep in the southern part of Fauquier county perished.

Petersburg, Virginia: snow fell on the 6th to the depth of fourteen inches. On the 7th street cars were obliged to suspend travel. Considerable damage was done to roofs by the weight of snow. The Appomattox River at this point was frozen over, impeding navigation for several days.

Chattanooga, Tennessee: snow began falling during the afternoon of the 3d and continued throughout the 4th and until the morning of the 5th. Heavy snow fell during the greater part of the 4th, with the temperature below freezing all day; total depth of snowfall thirteen inches. This storm was an unusual phenomenon for this section of the country; a similar snow storm has not occurred during the past thirty years. Street cars ceased running on the early morning of the 4th, and all trains arrived four to twelve hours late. Heavy snow fell also during the morning of the 6th.

Knoxville, Tennessee: the first snow of the season, and the heaviest that has occurred in this section for many years, began at 12.50 a. m. of the 4th and continued falling heavily until 10.30 p. m. At 12.10 a. m. of the 5th light snow began falling and continued at intervals throughout the day, the total depth for the two days was twenty-two and a half inches. All trains arriving on the 5th and 6th were several hours late, and many house roofs in the city were broken in by the weight of the snow.

Memphis, Tennessee: light snow fell at intervals during the 3d to a depth of five inches; snow fell also on the 4th and 5th. The street car tracks were obstructed by the heavy fall.

The dates on which snow fell in the various districts are as follows:

- New England.**—1st, 2d, 3d, 5th to 31st.
Middle Atlantic states.—1st to 7th, 13th to 20th, 22d to 31st.
South Atlantic states.—2d to 10th, 13th to 21st, 23d, 25th to 28th, 31st.
East Gulf states.—3d to 6th.
West Gulf states.—3d, 4th, 5th.
Tennessee.—3d to 6th, 15th, 31st.
Ohio Valley.—1st, 3d to 6th, 10th, 13th to 31st.
Lower lake region.—1st to 7th, 11th, 13th to 31st.
Upper lake region.—1st to 5th, 11th to 13th.
Extreme northwest.—2d, 3d, 7th, 10th, 11th, 13th, 14th, 16th, 17th, 18th, 20th to 26th, 28th to 31st.
Upper Mississippi valley.—1st, 3d, 4th, 10th to 31st.
Missouri Valley.—2d, 3d, 4th, 11th, 12th, 14th, 16th, 17th, 18th, 20th, 21st, 23d to 31st.
Northern slope.—1st to 5th, 10th, 11th, 13th to 18th, 20th to 31st.
Middle slope.—2d, 3d, 4th, 10th, 11th, 12th, 15th to 23d, 25th, 26th, 27th, 29th, 30th, 31st.
Southern slope.—4th, 30th, 31st.
Southern plateau.—9th, 10th, 11th, 30th, 31st.
Middle plateau.—8th to 13th, 16th, 17th, 20th to 26th, 28th to 31st.
Northern plateau.—11th, 14th, 16th to 31st.
North Pacific coast region.—6th, 9th, 10th, 11th, 20th, 21st, 22d, 25th to 29th.

MONTHLY SNOWFALLS.

[Expressed in inches and tenths.]

The following stations report monthly snowfalls of two inches or more:

- Alabama.**—Montgomery, 11; Livingston, 2.
Arizona.—San Simon, 3.
Arkansas.—Lead Hill, 2.6.
California.—Summit, 34; Fort Bidwell, 15.5; Cisco, 11; Truckee, 8; Emigrant Gap, 6; Boca, 4.
Colorado.—Denver, 10.8; Pike's Peak, 8.1; Montrose, 7.
Connecticut.—North Colebrook, 38.5; Wallingford, 23.5; Hartford, 17.5; Uncasville, 16; New Haven, 13.3; Bethel, 12.8; New London, 10.
Dakota.—Deadwood, 17.6; Fort Yates, 16.5; Fort Buford, 11.1; Webster, 8.4; Bismarck, 8.2; Yankton, 5.6; Huron, 4.9; Fort Totten, 4.3.
Delaware.—Cape Henlopen, 4.
District of Columbia.—Washington City, 16.6; Kendall Green, 6.5.
Georgia.—Athens, 4.5.
Illinois.—Windsor, 13.5; Sycamore, 13; Rockford, 10.8;

Pekin, 10.5; Chicago, 9.8; Sandwick, 9; Charleston, 7.6; Mattoon, 6.8; Anna, 6.2; Cairo, 6.1; Springfield, 5.

Indiana.—Logansport, 19.8; La Grange, 17.2; Angola, 16.2; Delphi and Farmland, 13.2; Columbia, 13; Fort Wayne, 12.5; Spiceland, 11.2; Marion, 10; Lafayette, 9.4; Mauzy, 9.2; Indianapolis, 9; Richmond, 8.4; Huntingburg, 5.7; Suman, 5.6; Connersville, 5.4; Worthington, 4.9; Princeton, 4; Blue Lick, 3.8; Jeffersonville, 3.4; Franklin and Degonia, 2.5; Bloomington, 2.4.

Iowa.—Dubuque, 13.7; Keokuk, 12.2; Fort Madison, 9.5; Des Moines, 9.2; Independence, 8.4; Bancroft and Muscatine, 8; Cresco, 6; Monticello, 5.9; Davenport, 5.7; Cedar Rapids a, 3.5; Cedar Rapids b, 3 to 4.

Kansas.—Emporia, 5; Salina, 3.5; Globe and Concordia, 2.5; Lawrence, Wyandotte, and Wakefield, 2.

Kentucky.—Richmond, 10; Frankfort, 5.5; Louisville, 2.

Maine.—Orono, 38.5; Portland, 25.6; Gardiner, 24.2; Bar Harbor, 19; Eastport, 15.6.

Maryland.—Woodstock, 14.5; Fallston, 14; Baltimore, 10.2; Cumberland, 9.

Massachusetts.—Salem, 29.5; Blue Hill Observatory, 29; Taunton, 28.9; Wood's Holl, 27.7; Worcester, 24.4; Milton, 24; Westborough, 23.5; New Bedford and Williamstown, 21.5; Dudley, 21.1; Fall River, 21; Princeton and Somerset, 20; Boston, 18.5; Leominster, 17; Amherst and Mount Nonotuck, 16; Chicopee, 13; Vinyard Haven, 12.2; Holyoke, 11.1; North Truro, 10; Nantucket, 5.6.

Michigan.—Thornville, 28; Pentwater, 24; Traverse City, 23.5; Kalamazoo and Mottville, 22; Marquette, 21.1; Detroit, 20.8; Hudson, 20.5; Swartz Creek, 20.2; Alpena, 17.8; Grand Haven, 15.1; Lansing, 14.2; Port Huron and Birmingham, 13.2; Manistique, 9; Mackinaw City, 8.1; Escanaba, 6.4.

Minnesota.—Duluth, 9.3; Saint Paul, 7.4; Saint Vincent, 2.8.

Montana.—Helena, 20.2; Fort Assinaboine, 11.2; Poplar River, 10; Fort Custer, 9.1; Fort Maginnis, 3.5.

Missouri.—Saint Louis, 7.4; Centreville, 4.1; Central College, 2.2.

Nebraska.—Fremont, 16.3; North Platte, 14.2; Genoa, 9.7; Valentine, 8.4; Hay Springs, 7.7; Marquette, 7.4; Crete, 5.3; Tecumseh, 5; Stockham, 4.2; Brownville, 4.

Nevada.—Otego, 4.2; Toano, 3.8; Palisade, 3; Tacoma, 2.2; Halleck, 2.

New Hampshire.—Mount Washington, 38.1; Nashua, 26.8; Antrim, 25; Berlin Mills, 22.

New Jersey.—Dover, 20.7; South Orange, 16; Moorestown, 15; Roseland, 14.5; Beverly, 13.8; Paterson, 13.5; Clayton, 8.5; Atlantic City, 8; Upper Montclair, 2.

New Mexico.—Santa Fé, 4.3.

New York.—Oswego, 29.4; Buffalo, 24.9; New York City, 21.9; White Plains, 21; Palermo, 19.5; Humphrey, 17.5; Auburn, 14.5; Setauket and Cooperstown, 13; Rochester, 12.5; Ithaca, 12.2; Albany, 11.1; Menand's, 11; Le Roy, 10.9; Penn Yan, 8.5; Factoryville, 7.9.

North Carolina.—Flat Rock, 20; Weldon, 9.5; Chapel Hill, 9; Statesville, 6; Lincolnton, 5.5.

Ohio.—Cleveland, 20; Wauseon, 19.9; Sandusky, 19.3; Hiram and Tiffin a, 18; Toledo, 17.8; Garrettsville, 16.5; Napoleon, 16.4; Tiffin b, 15; North Lewisburg, 13.8; West Milton, 10; Columbus, 9.9; College Hill and Jacksonborough, 7; Westerville, 4.3; Portsmouth, 3.6; Yellow Springs, 3.1.

Oregon.—Lakeview, 7.8.

Pennsylvania.—Erie, 24; Dyberry, 18.5; West Chester and Phillipsburg, 18; Bethlehem, 17; Easton, 16.7; Grampian Hills, 16; Catawissa, 13.3; Wellsborough, 13.2; Drifton, 11.2; Fallsington, 10.5; Zionsville, 10.1; Quakertown, 10; Philadelphia, 9.6; Wilkesbarre, 9.5; Blooming Grove, 9.4; Wysox, 6; Pittsburg, 4.4.

Rhode Island.—Lonsdale, 20.7; Pawtucket, 19.4; Narragansett Pier, 12.5; Block Island, 12.

South Carolina.—Spartanburg, 8.6; Pacolet, 5.5.

Tennessee.—Greeneville and Jonesborough, 36; Rogersville,

27; Parksville, 26; Knoxville, 25.4; Grief, 24.5; Fostoria, 20; Howell, 17.5; Manchester and Andersonville, 15.5; Farmingdale, 15; Chattanooga, 14.8; Beech Grove, 14.5; Cookeville, 13; Savannah, 12; Careyville, 11.5; Ashwood and Hurricane Switch, 11; Bolivar and Waynesborough, 10; Riddleton, 8.2; Hohenwald, 8; Florence Station, 7.6; Memphis, 6.7; Milan, Austin, and Sailor's Rest, 6; Covington, 5.5; Dickson, 4.3; Nashville, 4.2; McKenzie, 4; Waverly, 3.8; Trenton, 3.2.

Utah.—Salt Lake City, 5.6.

Vermont.—Strafford and Lunenburg, 29; Newport, 22.2; Post Mills, 21; Poultney, 18.3; Burlington, 17.

Virginia.—Marion, 39; Wytheville, 27; Rappahannock, 22.8; Dale Enterprise, 17; Lynchburg, 13.3; Accotink, 12; University of Virginia, 11.8; Variety Mills, 11.2; Norfolk, 9.2; Chincoteague, 4.1; Cape Henry, 4.

Washington Territory.—Fort Spokane, 14.5; Walla Walla, 8.7; Bainbridge Island and Pysht, 6; Tacoma, 2.5.

West Virginia.—Middlebrook, 36; Helvetia, 27; Port Angeles, 6.1; Parkersburg, 3.

Wisconsin.—Milwaukee, 19; Fond du Lac, 16.5; Manitowoc, 12.2; Delavan, 11.2; Green Bay, 9.2; Madison and Prairie du Chien, 9; Embarras, 7.1; Wausau, 4.5; La Crosse, 4.1.

Wyoming.—Fort Laramie, 7.5; Fort Bridger, 5.7.

DEPTH OF UNMELTED SNOW ON GROUND AT END OF MONTH.

[Expressed in inches and tenths.]

Colorado.—Denver, 3; Pike's Peak, 2.5; Montrose, 2.

Connecticut.—North Colebrook, 9; Hartford, 3; Bethel, 2; New London, 1; New Haven, 0.5.

Dakota.—Richardton, 12; Webster and Deadwood, 8; Bismarck, 7.7; Fort Totten, 7; Yankton, 4.7; Huron, 4.

District of Columbia.—Kendall Green, 0.4; Washington City, trace.

Idaho.—Boisé City, 0.3.

Illinois.—Pekin, 9; Charleston, 7.5; Peoria, 7; Sycamore, 6; Sandwich, 5; Collinsville and Windsor, 4.5; Mattoon, 4; Springfield, 2; Cairo, 0.1.

Indiana.—Logansport, 12.6; Mauzy, 9.2; Indianapolis, 3.8; Sunman, 0.5; Jeffersonville and Butlerville, trace.

Iowa.—Bancroft, 10; Keokuk, 8.3; Dubuque, 7.5; Fort Madison and Independence, 7; Cresco, 5; Monticello, 4; Davenport, 3; Cedar Rapids, 2.5; Des Moines, 2.

Kansas.—Globe, 0.5; Wyandotte, 0.3.

Kentucky.—Richmond, 0.5; Frankfort, 0.3; Louisville, trace.

Maine.—Orono, 15; Gardiner, 7; Portland, 3; Bar Harbor, 1; Eastport, 0.5.

Maryland.—Cumberland, 3; Woodstock, 2; New Midway and Baltimore, 1.

Massachusetts.—Princeton, 12; Amherst a, 6; Amherst b, Worcester, and Williamstown, 5; Somersett and Blue Hill Observatory, 4; Dudley, Fall River, Taunton, Boston, and Milton, 3.

Michigan.—Thornville, 20; Swartz Creek and Manistique, 18; Hudson, Kalamazoo, Pentwater, and Traverse City, 12; Lansing and Grand Haven, 11; Port Huron, 10; Marquette, 8; Detroit, 6; Alpena, 4; Mackinaw City and Escanaba, 3.

Minnesota.—Duluth, 12; Saint Paul, 10; Saint Vincent, 2.

Montana.—Helena, 12; Poplar River and Fort Assinaboine, 10.8; Fort Custer, 8.

Missouri.—Saint Louis, 6; Central College and Conception, 1; Centreville, 0.4.

Nebraska.—Genoa and Hay Springs, 6; Crete, 5.3; Fremont and Tecumseh, 5; Marquette and Valentine, 3; Brownville, 2; Stockham, 1.5; North Platte, 0.5.

New Hampshire.—Mount Washington, 22; Nashua, 10.

New Jersey.—South Orange, 3; Dover, 2; Beverly and Moorestown, 1; Upper Montclair, 0.5; Paterson, 0.2; Clayton, trace.

New York.—North Volney, 12 (in the woods); Oswego, 9; Palermo, 8; Le Roy, 6 to 8; Cooperstown, Factoryville, and Ithaca, 6; Humphrey and Buffalo, 5; Menand's, Penn Yan,

and Albany, 4; Auburn and White Plains, 3; Brooklyn, 2; Rochester, 1.7; New York City, 1.

Ohio.—Wauseon, 16; Sandusky, 12; Elyria and Tiffin a, 9.5; Napoleon, Tiffin b, Toledo, and Cleveland, 8; Hiram, 6; Garrettsville, 5; North Lewisburg, 4; West Milton, 3; Jacksonborough, 2; College Hill, Columbus, and Westerville, 1; Yellow Springs, 0.5.

Pennsylvania.—Easton, 16.7; Dyberry, 10; Grampian Hills, 9; Wysox, 8; Wellsborough, 5.6; Erie, 4; Catawissa and Phillipsburg, 3; Drifton, Wilkesbarre, and Zionsville, 2; Fallington and West Chester, 1.5; Pittsburg and Philadelphia, 0.5; Quakertown, trace.

Rhode Island.—Block Island, trace.

Vermont.—Newport, 20; Strafford, 18; Post Mills and Poultney, 13; Charlotte, 10 to 12; Burlington, 3.

Virginia.—Rappahannock, 3; Accotink and University of Virginia, 1; Dale Enterprise, Marion, and Variety Mills, trace.

Washington Territory.—Fort Spokane, 6; Walla Walla, 4.

West Virginia.—Middlebrook, 16; Helvetia, 1.

Wisconsin.—Milwaukee, 11; Fond du Lac, 9; Delavan, 8; Embarras and Green Bay, 7; Madison, 6; Prairie du Chien, 5; Wausau and La Crosse, 4.

HAIL.

Portland, Maine: on the 1st, between 1 and 2 a. m., a heavy thunder-storm, moving from the southeast to the northwest, passed over the city. The electrical part of the storm was quite severe for this season of the year, and one person was killed by lightning. Hail, the size of robin's eggs, fell from 1.25 to 1.30 a. m.

Hail is also reported to have occurred, as follows:

Arizona.—Prescott, 10th.

California.—Keeler, 9th.

Colorado.—Colorado Springs, 18th.

Indian Territory.—Fort Gibson, 3d.

Kansas.—Salina, 11th; Yates Centre, 12th; Dodge City, 14th.

Louisiana.—Liberty Hill, 17th; Shreveport, 23d.

Maryland.—Emmitsburg, 29th.

Massachusetts.—Amherst and Dudley, 31st.

Michigan.—Kalamazoo, 13th.

New Jersey.—Moorestown, 6th, 7th, 21st; Beverly, 6th, 26th, 31st; Dover and Upper Montclair, 31st.

New York.—Setauket, 5th, 7th, 31st.

North Carolina.—Raleigh, 5th; Weldon, 5th, 6th.

Ohio.—Jacksonborough, 14th, 17th; Garrettsville, 31st.

Pennsylvania.—Bethlehem, Quakertown, and Zionsville, 31st.

Tennessee.—Chattanooga, 4th.

Virginia.—Chincoteague, 5th; Dale Enterprise, 18th, 30th, 31st; Bird's Nest, 29th.

SLEET.

Sleet fell in the various states and territories during the month, as follows:

Arkansas.—Little Rock, 3d, 4th, 28th, 29th.

Connecticut.—New London, 5th, 7th; New Haven, 7th; Bethel, 31st.

Dakota.—Fort Totten, 10th, 13th; Yankton, 12th.

Georgia.—Augusta, 3d, 4th, 5th; Atlanta, 4th; Milledgeville, 4th, 5th.

Illinois.—Springfield, 23d; Cairo, 28th.

Indiana.—Indianapolis, Butlerville, Mauzy, Sunman, and Vevay, 31st.

Iowa.—Keokuk, 23d.

Kansas.—Concordia, 12th; El Dorado, 30th; Leavenworth, 30th, 31st.

Kentucky.—Louisville, 17th, 30th, 31st; Frankfort, 29th, 30th.

Maine.—Eastport, 16th.

Maryland.—Emmitsburg, 29th.

Massachusetts.—Vineyard Haven, 5th; Worcester, 12th.

Michigan.—Grand Haven, 13th.

Nebraska.—Genoa, 16th.

Nevada.—Winnemucca, 29th.
New Hampshire.—Mount Washington, 25th.
New York.—Albany, 1st, 8th, 31st; Setauket, 7th, 31st;
New York City, 15th, 31st; Palmyra, 31st.
North Carolina.—Wilmington and Charlotte, 4th; Weldon,
 31st.
Ohio.—North Lewisburg, 1st; Cleveland, 13th, 14th, 31st;
Cincinnati, 17th; Portsmouth, 17th, 31st; Columbus, West
 Milton, and Yellow Springs, 31st.
Pennsylvania.—Philadelphia, 6th; Franklin, 30th, 31st;
 Zionsville, 31st.
Rhode Island.—Block Island, 7th.
Tennessee.—Nashville and Milan, 28th.
Virginia.—Accotink, 5th; Variety Mills, 5th, 6th, 29th, 30th;
Lynchburg, 5th, 29th, 30th, 31st; Norfolk and Cape Henry,
 6th; Chincoteague, 6th, 29th, 30th.
Washington Territory.—Walla Walla, 19th, 27th to 31st;
Port Angeles, 25th; Pysht, 26th.

Table of excessive and greatest monthly precipitation for December, 1886.

Station.	Specially heavy.		Largest monthly.	Amount.	Station.	Specially heavy.		Largest monthly.	Amount.
	Date.	Amt.				Date.	Amt.		
British Columbia.					Oregon—Con.				
New Westminster.				15.89	Mount Angel.	8	2.10	12.45	
California.					Bandon.	8	2.05	11.97	
Fort Gaston.	10, 11	3.12		15.81	Do.	27, 28	2.42		
Do.	27, 28	3.70			Portland.	25, 26	2.20		
Delta.				8.81	East Portland.				11.52
Emigrant Gap.				7.40	Albany.				10.31
Colfax.				6.12	Eola.				9.08
Connetquot.					Roseburg.				7.30
Voluntown.				6.15	Fort Klamath.				6.55
Florida.					Rhode Island.				6.70
Pensacola.	10, 11	2.37			Tennessee.				
Sanford.	10, 11	2.18			Greenville.	5	3.00		
Alva.	31	2.00			Jonesborough.	5	3.00		
Illinois.					Parkeville.	6	2.00		
Marengo.	23	2.00			Washington Ter.				
Anna.	23, 24	2.03			Neah Bay.	2, 3	3.65	30.70	
Louisiana.					Do.	12	3.10		
Grand Coteau.	28	2.12			Do.	15, 16, 17	6.05		
Maine.					Do.	27, 28	3.60		
Eastport.	25	2.17	6.51		Do.	30, 31	2.05		
Orono.			6.38		Tatoosh Island.	12, 13	4.02	25.84	
Massachusetts.					Do.	15, 16	2.56		
New Bedford.			6.92		Do.	27, 28	3.17		
North Carolina.					Do.	31	2.38		
Charlotte.		5	2.06	6.26	Fort Canby.	6, 7	2.79	17.35	
Flat Rock.	4, 5, 6	3.95			Do.	31	2.58		
Hatteras.	5	2.65			Olympia.	31	2.50	13.38	
Oregon.					Bainbridge Isl'd.			11.15	
Astoria.	2, 3	2.02	16.89		Tacoma.	31	2.82	11.09	
Do.	20, 21	2.12			Walla Walla.			7.86	
Gardiner.	8	2.65	13.97		Port Angeles.			7.71	
Do.	28, 29	3.04							

WINDS.

The most frequent directions of the wind during December, 1886, are shown on chart ii by the arrows flying with the wind; they are also given in the table of miscellaneous meteorological data. In the Missouri and upper Mississippi valleys, Dakota, and Minnesota, the wind blew mostly from the north or northwest; in the Lake regions the prevailing direction was west; in New England and the middle Atlantic states, northwest. In other portions of the country the winds were variable.

HIGH WINDS.

[In miles per hour.]

Wind-velocities of fifty or more miles per hour were recorded during the month, as follows:

Mount Washington, New Hampshire, 84, nw., 1st; 84, nw., 2d; 83, w., 3d; 89, w., 4th; 54, se., 7th; 78, nw., 8th; 76, nw., 9th; 99, nw., 10th; 98, nw., 11th; 54, s., 13th; 84, w., 14th; 71, sw., 15th; 92, nw., 16th; 94, nw., 17th; 50, sw., 18th; 70, w., 19th; 78, w., 21st; 56, sw., 23d; 64, sw., 24th; 100, nw., 25th; 87, w., 27th; 77, nw., 28th; 78, w., 29th.

Pike's Peak, Colorado, 54, w. and nw., 1st; 52, nw., 2d; 58, n., 3d; 66, w., 9th; 74, n., 14th; 58, nw., 15th; 72, nw., 16th; 76, w., 20th; 72, nw., 22d; 70, n., 23d; 76, w., 24th; 50, w., 25th; 80, w., 26th; 72, nw., 27th; 56, nw., 28th; 64, w., 29th; 58, w., 30th; 56, n., 31st.

Cape Mendocino, California, 50, se., 5th; 76, se., 6th; 72, se., 7th; 60, se., 8th; 64, se., 10th; 72, se., 11th; 52, se., 12th; 65, se., 27th; 88, s., 28th; 70, se., 29th; 56, se., 30th; 52, se., 31st.

Fort Canby, Washington Territory, 50, se., 7th; 50, s., 12th; 50, s., 13th; 50, se., 15th; 58, s., 28th.

Block Island, Rhode Island, 51, ne., 6th.

Chincoteague, Virginia, 52, nw., 6th.

Nantucket, Massachusetts, 50, ne., 7th.

Tatoosh Island, Washington Territory, 51, se., 12th.

Fort Assinaboine, Montana, 52, s., 13th.

Fort Maginnis, Montana, 52, w., 13th; 54, w., 19th.

Valentine, Nebraska, 56, nw., 14th.

Fort Elliott, Texas, 52, nw., 14th.

Sandusky, Ohio, 52, n., 15th.

Fort Totten, Dakota, 50, sw., 20th.

Fort Buford, Dakota, 50, w., 20th.

Kitty Hawk, North Carolina, 52 ne., 25th.

INLAND NAVIGATION.

STATE OF WATER IN RIVERS AND HARBORS.

Heavy ice formed on the Mississippi River in the vicinity of Cairo, Illinois, on the 1st. Owing to the low stage of water in the river, and its consequent liability to freeze quickly, the Anchor line of steamers went into winter quarters as they arrived at this port. On the 4th the river had become covered with heavy ice from the mouth of the Ohio to Saint Louis. At Bird Point, Missouri, the junction of the Mississippi and Ohio Rivers, the ice had been forced up to such a height around the "cradles" that the transfer steamers were unable to reach their wharves. Owing to the low stage of water in the river several steamers were aground a short distance above Cairo on the same date; on the 14th the river was reported by steamboat men to be lower than at any other time during the past five years, and many old wrecks were visible that had not been seen since their destruction. Heavy floating ice passed down the Ohio and Mississippi Rivers at Cairo every day of the month; on the 30th it became heavy enough to impede navigation. At Saint Louis, Missouri, river navigation was suspended on the 1st on account of low water and floating ice; during the afternoon of the same day the Mississippi River was gorged with ice at Warsaw, Illinois, and the Illinois River at Beardstown, Illinois. The observer at Saint Louis, Missouri, states that the Mississippi River was lower during the first five days of the month than at any other time since river observations have been made; after the 6th it began rising and on the 19th was 7.9 feet above low-water mark. On the 6th the ice gorged at South Saint Louis, causing a rise of five feet at points immediately above; the gorge did not break until 4 p. m. of the 10th, and resulted in a rapid decline in the river at this point. Large quantities of ice passed down the river every day of the month. At Dubuque, Iowa, very low temperatures prevailed during the 1st, 2d, and 3d, and ice began forming rapidly on the Mississippi River at Dubuque, on the 1st; on the 3d the river was covered with ice of such thickness as to allow vehicles to cross from one side to the other.

Navigation on the Hudson River became practically closed for the season about the 6th; on that date the ice in the river, from Rondout northward, ranged from two to six inches in thickness and ice men were already at work filling their ice-houses. All the freight and passenger steamers plying between New York City and points north of Poughkeepsie went into winter quarters about the 4th. The propeller "Newburg" left New York City on the 27th for Newburg, but became fast in the ice when two miles north of Cold Spring, New York, and was obliged to return.

Duluth, Minnesota: the water in the harbor became frozen over on the 5th and ice began forming along the lake shore on the same date. A field of ice was observed on the 16th near the south shore; it continued to extend until the 24th, when it was within a mile of the north shore, and at the end of the month had nearly covered the lake.